The spicules are straight slender bacilli, bearing obtuse spines on two of their sides; these are tolerably long and of the same diameter as the bacillus itself. They are consequently very analogous in their form to those of certain species of *Cidaris*, and especially to the second of the forms represented in fig. 8 of the fifth plate of my memoir on the Echinida. This figure represents various forms of the spicules of a *Brissopsis* from Mexico. In *Echinoneus* there is merely a greater homogeneity of form.

Thus the *Echinonei*, which in form and in the greater part of their characters are intermediate between the regular Echinidæ and the Spatangoidæ, are equally intermediate in the constitution of their ambulacra.

It is to be wished that those naturalists who possess irregular Echinida in a good state of preservation would fill up the gaps which I have been obliged to leave in my general work, at least if they are convinced that the pedicellariæ and ambulacra can furnish good characters, as I believe I have shown to be the case.—*Annales des Sci. Nat.* 5e sér. tome xiv. art. 5.

On the Reproduction of the Lophobranchs, and on the Filiation of certain Genera. By M. Canestrini.

It is known that the males of these fishes, or at least of the greater part of them, present cavities at the lower surface of the tail, in the form of fossettes, or of sacs, in which the ova undergo development, and in which the young remain for a certain time after exclusion. M. Canestrini has not been able, any more than the ichthyologists who preceded him, to actually see the manner in which the ova arrive in these receptacles; nevertheless he gives a sufficiently plausible hypothesis, based on certain anatomical arrangements. He supposes a sort of coition, in which, contrary to what is seen in other cases, the female products pass into the body of the male. The position of the sexual orifice of the female and that of the opening of the ovigerous sac would facilitate this. In fact the female sexual orifice looks downwards, and the orifice of the ovigerous sac is directed upwards, so that, if an individual of each sex be placed the one against the other, the female orifice will face the orifice of the ovigerous sac and be able to discharge its ova into the latter. It is probable that the prehensile tail of these animals also plays a part (at least in the case of the *Hippocampi*) by enabling the two individuals to hold each other closely united during this act, which must last a certain time or else be repeated again and again. The concourse of the sexes is evidently indispensable with the *Nerophes*, which have no pouch to receive the ova, but merely a series of fossettes at the surface of the belly, so shallow that no ovum could remain there if it were not deposited in its place and fixed by an adhesive substance.

M. Canestrini thinks that the male fecundates the ova after they have entered the ovigerous sac, the male sexual opening communicating with that cavity by means of a duct formed at the expense of

the swollen walls of the anterior part of the sac. In this duct is found the anal fin, so well concealed that some very accurate observers, such as Van der Hoeven, have denied its existence. The movement of this fin must facilitate the renewal of the water in which float the ova or the hatched young.

The development of the Lophobranchs offers some interesting and rather important facts. Thus M. Canestrini has observed that the *Hippocampi* have, during the initial portion of their life, a snout of normal dimensions; so that the characters of the order only appear in them at a rather advanced period of their development.

Dr. Fries remarked that *Nerophis lumbriciformis* in the young state possesses very distinct pectorals and an embryonic fin comprising the caudal, while in the adult state it is entirely destitute of the former and has only a trace of the second under the form of a dorsal fin. A similar thing occurs with the *Hippocampi*. These fishes are distinguished, when adult, from the *Siphonostomi* and *Syngnathi* by the absence of a caudal fin. But on examining individuals of *Hippocampus brevirostris* of $5\frac{3}{4}$ millims. length, M. Canestrini discovered that they possess a caudal fin perfectly distinct, though little developed. It is formed by a prolongation of the skin which covers the posterior extremity of the animal, and consists of membrane only, without a trace of rays. This observation becomes very important when we remember that in the eocene period there were *Hippocampi* with a caudal fin—a character considered by Agassiz sufficient to separate them generically from those of our present seas, under the name of *Calamostoma*. *C. breviculum*, Ag., bears a very distinct rounded fin.

M. Canestrini relies on these embryological and palæontological facts in order to establish the genealogy of the living genera. He arrives at this conclusion—that *Nerophis* is descended from *Syngnathus*, and *Hippocampus* from *Calamostoma*. He says:—

"The *Syngnathi*, in losing the pectoral fins and the caudal, have given birth to the *Nerophes*, which still preserve during the embryonic period, and as a proof of their origin, those same fins which their ancestors retained during their whole life.

"These conclusions may seem to some persons too premature; and they will ask, as do all the opponents of these ideas, 'Where are the links which ought to unite the two?' or else, 'Which is the derived form? the genus *Syngnathus*, or the genus *Nerophis*?'

"I am, fortunately, able to answer this question, because between the *Syngnathi* (furnished with a well-developed caudal) and the *Nerophes* (quite destitute of a caudal) there exist other *Nerophes*, which possess when adult a rudimentary caudal, and constitute as it were a transition between the extreme forms. In support of this assertion I may mention *Nerophis anguinea*, *N. Heckeli*, and *N. æquorea*, all of which have a rudimentary caudal.

"One may with perfect safety say that *Nerophis* is a genus in process of formation. When the caudal fin, already at the most rudimentary, shall be entirely atrophied in all the species, and shall

be no longer present even in the embryos, then we shall be able to affirm that *Nerophis* is a good genus, because it will be quite distinct from *Syngnathus*. At present we cannot quite say that, as is proved by the uncertainty which prevails in the classification of certain species: thus, for example, Kaup places the *Nerophes* with rudimentary tail in the genus *Nerophis*, while Rafinesque and Bonaparte refer them to the genus *Syngnathus*.

"In the same manner the tertiary *Calamostoma*, in losing the caudal fin, gave rise to the existing *Hippocampus*, in which the caudal fin is only present in the embryo.

"It is extremely probable that the caudal fin, before disappearing from the adults, passes through the rudimentary state, as is the case in the species of *Nerophis* cited above. No *Hippocampus* is yet known presenting this degree of conformation; but one may entertain the expectation of discovering, either in the present seas or in the posteocene formations, *Hippocampi* possessing in the adult condition a rudimentary caudal.

"With fishes the caudal is a powerful organ of locomotion. In this respect *Hippocampus* is an exception, in that it effects its movements principally by means of the dorsal. To it a caudal would be almost useless; and if that fin existed in the Calamostomes, perhaps the reason was that it was inherited from other fishes. In the *Hippocampi* it has been subjected to that law which condemns useless organs first to become rudimentary and then atrophied in the adults, and at last to disappear even in the embryo. The existing *Hippocampi* are found precisely in the second of these three phases."

The paper of M. Canestrini concludes with a descriptive and analytical catalogue of the Lophobranchs of the Adriatic, comprising 12 species, distributed into 4 genera:—*Hippocampus*, 2 species; *Siphonostomus*, 2; *Syngnathus*, 6, of which one (*S. tænionotus*) is new; and *Nerophis*, 2. He rectifies numerous errors of synonymy committed by various authors, in particular by Bonaparte, whose 28 species of Lophobranchs ought to be reduced to 19.—*Bibliothèque Universelle, Archives des Sciences Physiques et Naturelles*, July 15, 1871, pp. 355–358.

On a new Organ of Innervation, and on the Origin of the Nerves of Special Sensibility in the Aquatic Pulmonate Gasteropoda. By M. Lacaze-Duthiers.

In a former memoir I made known to the Academy a constant and important relation which exists between the organ of hearing and the posterior nervous centres of the Gasteropoda. Now, by the investigation of nervous centres by means of histological preparations intended to allow the nerves to be traced to their true and real origins, I have been led to the knowledge of new facts of great value for the knowledge of the relations and morphological comparisons.

I believe that no one has yet indicated the existence in the sub-